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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NORMAN L. WEINBERG, KLAU TOMANTSCHGER,
ROBERT S. FELDSTEIN, J. DAVID GENDERS,
and JOSEPH M. RAIT

Appeal 2008-1543
Application 10/643,344
Technology Center 1700

Decided: April 30, 2008

Before TERRY J. OWENS, THOMAS A. WALTZ, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

WALTZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Primary Examiner's refusal to allow claims 28-30 and 33-41 as amended subsequent to the final rejection (*see* the Amendment dated Nov. 2, 2006, entered as per the Advisory Action dated Nov. 14, 2006; App. Br. 2).

Claims 42-48 are the only other claims pending in this application and stand allowed by the Examiner (App. Br. 1-2). We have jurisdiction pursuant to 35 U.S.C. § 6(b).

According to Appellants, the invention is directed to an apparatus for the electrolysis of water comprising an electrochemical cell and a pulsed power supply (App. Br. 3). Independent claim 28 is illustrative of the invention and a copy of this claim is reproduced below:

28. An apparatus for electrolyzing water for the production of hydrogen, oxygen and heat, which comprises:

- (i) an electrochemical cell having an isotopic hydrogen storage cathode, an electrically conductive anode and a compartment for holding an ionically conducting electrolyte comprising water, and
- (ii) a pulsed power supply for said electrochemical cell comprising means for generating a repeating sequence of voltages across said anode and said cathode, each said sequence including a first cell voltage regime consisting of a voltage sufficient to enhance cathodic absorption of hydrogen and a second voltage regime consisting of at least one voltage pulse which is at least two times the voltage of the first cell voltage regime in magnitude with a duration not greater than 0.10 seconds.

The Examiner has relied on the following prior art references as evidence of obviousness:

| | | |
|---------|-------------|---------------|
| Spaepen | 3,944,473 | Mar. 16, 1976 |
| Pons | WO 90/10935 | Sep. 20, 1990 |

ISSUES ON APPEAL

Claims 28-30 and 33-41 stand rejected under 35 U.S.C. § 103(a) as obvious over Pons in view of Spaepen (Ans. 3).

The Examiner contends that Pons teaches an apparatus for electrolyzing water with the production of hydrogen, oxygen, and heat, where the apparatus includes an electrochemical cell having a palladium cathode (i.e., an isotopic hydrogen storage cathode), an electrically conductive anode, and a compartment for holding an ionically conducting electrolyte comprising water, with a pulsed power supply (Ans. 3).

The Examiner admits that the pulsed power supply taught by Pons generates only a single voltage regime with a voltage sufficient to enhance cathodic absorption of hydrogen, thus failing to teach a pulsed power supply with a second voltage regime consisting of at least one voltage pulse which is at least two times the voltage of the first cell voltage regime in magnitude with a duration not greater than 0.10 seconds (Ans. 3). However, the Examiner contends that Spaepen teaches a method of influencing an electrocatalytic reaction proceeding at an electrode by superimposing a voltage regime of pulses upon the cell voltage to enhance the efficiency of the cell (*id.*). The Examiner further contends that the pulsed power supply and voltage regimes taught by Spaepen are applicable to any electrocatalytic reaction where at least two reactions occur at an electrode (Ans. 4). Since Pons teaches multiple reactions occurring at the cathode of the cell, the Examiner concludes that it would have been obvious to have added the pulsed power supply of Spaepen to the apparatus of Pons to allow

preferential formation of a desired product when multiple reactions occur at an electrode (*id.*).

The Examiner contends that the pulsed power supply of Spaepen would have been capable of operating in the manner claimed, and since these parameters of voltage magnitude and duration are related to the manner of operation of the apparatus, they have not been given “patentable weight” (Ans. 4-5).

Appellants contend that Spaepen conducts oxidation reactions electrochemically at the anode but is not directed to the electrolysis of water as required by the claims on appeal (App. Br. 10; Reply Br. 2 and 6).

Appellants also contend that the doctrine of “inherency” is based on § 102 rejections, where every limitation of the claimed invention is disclosed in a single prior art reference, and is not based, as here, on a combination of references (App. Br. 17).

Appellants further contend that the combination of Pons and Spaepen has already been considered in the Board Decision dated Jan. 31, 2003, in parent Application No. 08/334,952 (App. Br. 14).

Accordingly, the issue presented from the record in this appeal is whether Appellants have established that the Examiner reversibly erred in combining Pons and Spaepen to establish a *prima facie* case of obviousness. For the reasons stated in the Appeal Brief, Reply Brief, and below, we agree with the Appellants that the Examiner has not established a *prima facie* case of obviousness on this record. Therefore, we do not sustain the ground of rejection on appeal and REVERSE the decision of the Examiner.

OPINION

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations, if any. *See Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). The obviousness analysis should include any apparent reasons to combine any known elements in the fashion claimed by Appellants. “To facilitate review, this obviousness analysis should be made explicit. *See In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) (‘[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness’).” *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007).

The Examiner finds, and Appellants do not dispute, that Pons discloses all limitations of claim 28 on appeal except clause (ii) (Ans. 3; App. Br. 9). With regard to the clause (ii) limitation of claim 28 on appeal, the Examiner admits that Pons only discloses a power supply that generates a single voltage regime, with a voltage sufficient to enhance cathodic absorption of hydrogen (*id.*). The Examiner applies Spaepen for its teaching of a method of influencing an electrocatalytic reaction proceeding at an electrode by superimposing a voltage regime of pulses upon the cell voltage to enhance the efficiency of the cell (Ans. 3). The Examiner finds that

Spaepen teaches a pulsed power supply capable of applying the claimed second voltage regime (Ans. 3-4).

We determine that the Examiner’s “rational underpinning” does not support the legal conclusion of obviousness. *See KSR, supra.* We agree with the Examiner that Pons discloses four “reaction steps” that occur at the cathode when an alkaline source of heavy water is subject to electrolysis (Pons 25, first full para.). However, we find that these “reaction steps” are not two different reactions as disclosed and defined by Spaepen (*see* App. Br. 12-13). We determine that Spaepen teaches that “when at least two reactions *each comprised of a series of part reactions*, occur at the electrode,” then a series of voltage pulses will improve or reduce the various final products (col. 4, ll. 29-34, emphasis added). We determine that one of ordinary skill in the art would have considered the four “reaction steps” taught by Pons to be one reaction (electrolysis of heavy water) with a series of part reactions. We also determine that the Examiner has not properly established any cogent reasoning to combine the teachings of Spaepen with the disclosure of Pons. As correctly found by the Examiner, Pons is directed to an apparatus for the electrolysis of water (Ans. 3). We determine that Spaepen teaches the use of a pulsed power supply only with the oxidation of methanol on a platinum electrode (an organic synthesis) or the oxidation of hydrogen, hydrazine, or ammonia on an alloy electrode (an inorganic synthesis).¹ We determine that the Examiner has not supplied any cogent

¹ We note the Examiner’s reliance of the teaching of Spaepen that “[u]se thereof can be made with electro-organic synthesis” (col. 4, ll. 34-35; Ans.

reasoning to combine the teachings and apparatus of Spaepen with the apparatus of Pons when these two references are directed to such disparate reactions.

The Examiner finds that the power supply suggested by Spaepen was “capable” of adjusting the duration and magnitude of the potential pulse train to meet the claimed limitations of at least two times the voltage with a duration no greater than 0.10 seconds (Ans. 8; *see* claim 28 on appeal). However, the rejection on appeal is based on § 103(a), not §102. *See In re Schreiber*, 128 F.3d 1473, 1477-79 (Fed. Cir. 1997) (In a § 102 rejection, a functional limitation asserted to be critical for establishing novelty may be an inherent characteristic of the prior art if the prior art structure is capable of performing the functions as claimed). The Examiner has not alleged, much less established, that the power supply disclosed by Pons is capable of generating voltage pulses of the voltage and duration required by claim 28 on appeal.

For the foregoing reasons and those set forth in the Briefs, we do not sustain the ground of rejection on appeal. The decision of the Examiner is reversed.

REVERSED

6). However, as correctly argued by Appellants (Reply Br. 2), the oxidation of methanol as taught by Spaepen is an electro-organic synthesis while the electrolysis of water as disclosed by Pons is an electro-inorganic synthesis. We also note that the oxidation of hydrogen, hydrazine, or ammonia taught by Spaepen are all electro-inorganic syntheses.

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